



0V4 L -XOLH 6XOOLYDQ  
)HEUXDU L L → ☼ L L !! ♣ ← L  
3DUH L L RI L ← L L  
L

- x L 3URMFW 6FKHGCH 8SGDWH L
- x L 3URMFW 7HP 2UJDLJDLRQ DQG 5HMSRQMLELOWLHV L
- x L \$\$\$GGL L ' L 4XDOLM \$WALDQFH 3URMFW 3ODQ L DQG L L
- x L 5HIIHQFHV L

([FHSV DV RWKHUZLVH VSHFLILHG EHZRZ L WKLV \$PHQGPHQV L !! ♣ ← + !! ♣ L LQFRUSRUDWHV WKH  
\$WALDQFH 3URMFW 3ODQ ♂ 4\$33 L LQFOXGH ZLWK WKH DSSURYHS \$28 3DUDJDSK L ↑ L ◀ L L  
\$WODQLF 5LFKILHOG UHTXWV (3\$ DV DSSURYD RI WKLV \$PHQGPHQV L !! ♣ ← + !! ♣ L SXU  
3DUDJDSK L ↑ L RI L WKH \$28 L

6XPPDU L RI 3UHYLRXV \$\$\$OLFDECH \$PHQGPHQV WR WKH L !! ♣ L 5\$:3 L

7KH L L !! ♣ L 5\$:3 ♂ \$WODQLF 5LFKILHOG L L !! ♣ L D L SUHQW WKH VFRSH RI ZWHU WUHDV  
FRQGFHWG DV WKH VLWH LQ DFFRUGDQH ZLWK WKH \$28 L \$OD VFWLRQ RI WKH L L !! ♣ L 5\$:3  
WR \$PHQGPHQV L !! ♣ ← + !! ♣ ☼ L H[FHSV IRU WKH VFWLRQ FRGLILHG E\ SUHYLRXV DPHQGPHQV D  
EHORZ

x L \$OD UHIIHQFHV WR WUHDV OLQH 6LVH +DQK L 6DIHW L 6FXULM L DQG (QYLRQH  
3URJUDP 'RFXPHQV 9HULRQ ♂ 66 L 3URJUDP 'RFXPHQV L KDYH EHQ FRGLILHG LQ  
SUHYLRXV DPHQGPHQV DQG VKOO EH FRQLGHUHG FRGLILHG ZLWK \$PHQGPHQV L !! ♣ ← + !! ♣ L  
UHIIHQFHV WKH FXUHQV YHULRQ RI WKH +66 L 3URJUDP 'RFXPHQV ♂ \$WODQLF 5LFKILHOG  
L L !! ♣ ← F L

x L 6FWLRQ ♣ L 6LVH \$DVMHQ FRGLILHG WR LQFOXGH WKH VLWH DFFHW SURYLVRQ  
SUHQWV LQ 5\$:3 \$PHQGPHQV L !! ♣ L ♂ \$WODQLF 5LFKILHOG L L !! ♣ L D L

x L 6FWLRQ L ♣ L 6LVH \$FFHW L /\$6 ORELJDLRQ L DQG \*HQUDO 3RGL KDV SUHD \$FALYLV  
EHQ FRGLILHG WR LQFOXGH WKH WRUP ZWHU FRQLWRUQ D FALYLVH SUHQWV LQ 5  
\$PHQGPHQV L !! ♣ L ♂ \$WODQLF 5LFKILHOG L L !! ♣ L D L DQG LQ WKH 5HMSRQH WR  
5\$:3 \$PHQGPHQV 1R L L !! ♣ L ♂ \$WODQLF 5LFKILHOG L L !! ♣ L E L

x L 6FWLRQ L L L L ♣ L ORGHV RI 2SHUDNRQ FRGLILHG WR FODUL L WKH XVH RI 6KXGRQ  
ORGH UDWKHU VKOQ 6DQGE\ ORGH GULQJ , QWUPLWHQV ORGH 2SHUDNRQ DV SUHQWV LQ  
5\$:3 \$PHQGPHQV L !! ♣ L ♂ \$WODQLF 5LFKILHOG L L !! ♣ L L L

x L 5HIIHQFHV WR WKH 7UHDV 6\WVP 2SHUDNRQ DQG ODQVHQDQH ODQD  
♂ 6FWLRQ L L L L L 6\WVP ODQVHQDQH L \$WODQLF 5LFKILHOG L L !! ♣ L KDYH  
LQ SUHYLRXV DPHQGPHQV DQG VKOO EH FRQLGHUHG FRGLILHG ZLWK \$PHQGPHQV L !! ♣ ← + !! ♣ L  
WR UHIIHQFHV WKH FXUHQV YHULRQ RI WKH +66 7UHDV 6\WVP 2SHUDNRQ D  
ODQVHQDQH ODQD ♂ \$WODQLF 5LFKILHOG L L !! ♣ ← E L

x L 6FWLRQ L L L L ♣ L 8% 7UHDV 6\WVP \*HQDNGE 6RLO FRGLILHG WR FRUH  
DFFXDW\ GFMULEH SDMLYH GHZWHUQJ VFKRORJ DV GFMULEH LQ WKH 5HYLVH  
5\$:3 \$PHQGPHQV 1R L L !! ♣ L ♂ \$WODQLF 5LFKILHOG L L !! ♣ L L

0V4 L -XOLH 6XOOLYDQ  
)HEUXDU L L → ♂ L L L !! ♀ ← L  
3DUH L T L RI L ← L L  
L

x L 5HIIHUQHIV L WR L \$8% L 7UHDVPHQV 6\WHP L 2SHUDWRQ L DQG L ODQWHDQFH L ODOXDO L  
♂ 6HFALRQ L † ◀ T ◀ ♀ ◀ L \$VODQVLF L 5LFKILHOG L L † !! ♀ ♀ E◻ L KDYH L EHQ L PRGLILH  
DPHQPHQV L DQG L VKOO L EH L FROVLGHUHG L PRGLILHG L ZLWK L \$PHQPHQV L † !! ♀ ← † !! ♀ L WR L UHILH  
WKH L FXUHQV L YHMLRQ L RI L WKH L \$8% L 7UHDVPHQV 6\WHP L 2SHUDWRQ L DQG L ODQWHDQFH L ODOXDO L  
♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ ← D◻ ◀ L L

x L 6HFALRQ L † ◀ ♀ ◀ L L \$8% L 7UHDVPHQV 6\WHP L ORQVWRULQJ L DQG L BDRSOLEHQ L 3ODQ  
PRGLILHG L WR L LQFOXGH L SURYLVRQ L SUHQVHG L LQ L WKH L † !! ♀ T L \$PHQPHQV L - † L WR L WKH  
♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ T E◻ ♂ L ZLWK L GHMULEHV L HQKQFH L TXDUWLO L VDPOLQJ L IRU  
WRWD L VAOILGH L DQG L HWKQRO L WR L PRQVWU L V\WHP L SHUIRUPDQH L L

x L 6HFALRQ L → ◀ L L 6LWH L 2SHUDWRQHQ L PRGLILHG L DV L SUHQVHG L LQ L 5\$:3 L \$PHQPHQV L  
1R◻ L L † !! ♀ † † !! ♀ L ♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ † D◻ L WR L UHICFW L VKDW L WKH L SULFDU L  
5LFKILHOG L WUHDVPHQV L UHQVHG L DFALYVWLV L LQFOXGLQJ L VLWH L ORJLWLV L DQG L RSHUDWRQ  
UHJXODV L UHSLVWQ L FKQJHG L IURP L ODUF L /RPEDUG L RI L \$0(& L (QYLURQHQV L L  
, QIUDWUXFWXU L , QF◻ L WR L OLNH L -RQVWU L RI L &RSSHU L (QYLURQHQV L &RQVWU L L L L

x L 6HFALRQ L → ◀ T L +66( L &FRUGLQWRQ L DQG L 2YHMLVWLV L PRGLILHG L DV L SUHQVHG L LQ L  
5\$:3 L \$PHQPHQV L 1R◻ L L † !! ♀ † † !! ♀ L ♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ † D◻ L WR L UHICFW L WKH  
\$VRFDWHV L , QF◻ L ZLOO L SURYLGH L +66( L &FRUGLQWRQ L EHQHQ L \$VODQVLF L 5LFKILHOG L L 8◻ 6  
/5:48% L DQG L VLWH L YLWVWU L L

x L 6HFALRQ L ◀ !! L 5HIIHUQHV EHQ L PRGLILHG L IRU L HFK L \HDO L DPHQPHQV UHMLRQ L WR L  
UHICFW L WKH L SURSRVHG L VFKHGCH L IRU L ZDVHU L WUHDVPHQV DFALYVWLV L DQG L D L UHMLHG L VHV  
LQFOXGH L LQ L WKL L 5\$:3 L \$PHQPHQV L † !! ♀ ← † !! ♀ ◀ L L L L

x L )LXUH L T KDV L EHQ L PRGLILHG L DV L SUHQVHG L LQ L 5\$:3 L \$PHQPHQV L 1R◻ L L † !! ♀ † † !! ♀ L ♂ \$  
5LFKILHOG L L † !! ♀ † D◻ L WR L LQVWUWH L FROVHDQFH L XPS L DQG L CRZ L ICRZ L XPS L CRFDWRQV

x L )LXUH L L KDV L EHQ L PRGLILHG L IRU L HFK L \HDO L DPHQPHQV WR L UHICFW L WKH L SURSRV  
VFKHGCH L IRU L ZDVHU L WUHDVPHQV DFALYVWLV L IRU L † !! ♀ ← ◀ L L L \$ L UHMLHG L )LXUH L L  
\$VDFKPHQV L \$ L WR L WKL L \$PHQPHQV L L L L L

x L \$\$\$GGL L \$ L ± L +66( L 3URJUD L 'RFXPHQV EHQ L PRGLILHG L LQ L SUHMLRQV L DPHQPHQV L  
DQG L LV L DJDLQ L PRGLILHG L ZLWK L \$PHQPHQV L † !! ♀ ← † !! ♀ L WR L LQFOXGH L WKH L FXUHQV L YHMLRQ  
+66( L 3URJUD L 'RFXPHQV L ♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ → F◻ ◀ L

x L \$\$\$GGL L & L ± L 'DVD L 4XDOVM L 2EMFALYH L 3URFHV L L :RMMKHWQ L PRGLILHG L DV L  
SUHQVHG L LQ L 5\$:3 L \$PHQPHQV L 1R◻ L L † !! ♀ † † !! ♀ L ♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ † D◻ L  
WKH L 3URFHV L 4XDOVM L \$VXUQFH L ODDJHU L ZLOO L EH L D L &RSSHU L (QYLURQHQV L &RQVWU L  
HPSORVH L L

x L \$\$\$GGL L ' L ± L 4XDOVM L \$VXUQFH L 3URFHV L 3ODQHQ L PRGLILHG L DV L SUHQVHG L LQ L  
5\$:3 L \$PHQPHQV L 1R◻ L L † !! ♀ † † !! ♀ L ♂ \$VODQVLF L 5LFKILHOG L L † !! ♀ † D◻ L WR L PRGLILH  
UHMLRQV L IRU L WKH L 3URFHV L 4XDOVM L \$VXUQFH L ODDJHU L DQG L WKH L 'DVD L 5HMLRQ  
&KPLVW L , Q L DGLWRQ L )LXUH L † ♀ L ♂ \$VDFKPHQV L %◻ L ZDV L XSGVHG L WR L VKRZ L D L UHMLRQ  
RSHUDWRQV L RUJDQLWRQ L L

'LWULEXALRQ L /LWV

7KH L GLWULEXALRQ L OLWV L LV L DPHQPHQV L DV L IROORZV L

L

0V◀ L -XOLH L 6XOOLYDQ L  
)HEUXDU L L → ♂ L L !! ♀ L ← L  
3DUH L L RI L ← L L  
L

♀ L ◀ L 5HSODFH L 'RXJ L &DUH \ @V L ♂ \$MDDQWLF L 5LFKILHOG ♂ L L ± !! ♀ ↑ □ L LQIRUPDWRQ L ZLWK L WKH L IR

6FRW L )HUJXVRQ L  
/DKRQNDQ L 5HJLRQD L :DNH L 4XCOLM L &RQWRO L %FDUG L  
± ↑ !! ♀ L /DNH L 7DKRH L %RXCHYDUG L  
6RXWK L /DNH L 7DKRH L &\$ L L ♀ ↑ !! L  
211LFH L ♂ ↑ T !! □ L ↑ L ± ↑ L T ± L  
(FDLO L VFRW L IHUJXVRQ #ZDWHJERDUG L FD L JRY L

± L ◀ L 5HSODFH L / \GG L 'HMFKDPEDXON ♂ L 530 L ♂ \$MDDQWLF L 5LFKILHOG ♂ L L ± !! ♀ ↑ □ L LQIRUPDWRQ L Z  
IRORZLQJ L

-XOLH L 6XOOLYDQ ♂ L 530 L  
(3\$ L 6XSHU \ XCG L 3URMFW L ODDJHU L  
8◀ 6◀ L (3\$ L 5HJLRQ L L  
→ ↑ L +DZAKRUQH L 8\UHW L ♂ 6)' L → L T □ L L  
6DQ L )UDQFLVFR ♂ L &\$ L L L ♀ ↑ !! L  
211LFH L ♂ L ♀ ↑ □ L L → L ± L T L T L L  
ORELCH L ♂ L L ± ← □ L L ± L L ↑ L ← ♀ L L L  
(± FDLO L VXOOLYDQ L MXOLH #HSD L JRY L

6WRUP L :DNH L &RQWRO L OHDVXUHV L

\$MDDQWLF L 5LFKILHOG L ZLOO L FRONLQX H L VR L FDQJH L DQG L FRQWVU L WRUP L ZDWHU L LQ L DQG L DURXGG L W  
7UHDWPHQV L 6\WHP L DQG L WKH L \$% L 7UHDWPHQV L 6\WHP L LQ L L ± !! ♀ L ← L FRQMLWPHQV L ZLWK L WKH L FHWKRG L  
LQ L \$PHQPHQV L 1R L L ± !! ♀ L L ± !! ♀ L ♂ \$MDDQWLF L 5LFKILHOG ♂ L L ± !! ♀ L D L DQG L L ± !! ♀ L E L L L L

+ '6 L 7UHDWPHQV L 6\WHP L ORGL L LFDWRQV L

+ '6 L 7UHDWPHQV L 6\WHP L 3LSLQJ L 5HSODFHQV L

)RU L WKH L 'HWD L 6HS L ♂ '6 L FDSXU L DQG L FRQYH \ DQFH L V \ WHP ♂ L WKH L \ HORPLGH ä L FRQYH \ DQFH L SL  
EH L UHSODFH G L RQ L WKH L XQLQ \ XDWG L SLSHOLGH L L 7KHMH L FRGL L LFDWRQV L DUH L DQWFLSDWGH L VR L EH L  
GXULQJ L L ± !! ♀ L ← L VSULQJ L FRPPLWLRQLQJ L L

+ '6 L 7UHDWPHQV L 6\WHP L \*HQHLDWRU L (QJLQH L 5HSODFHQV L L

'XULQJ L L ± !! ♀ L ← L 6SULQJ L FRPPLWLRQLQJ ♂ L VZR L RI L WKH L + '6 L 7UHDWPHQV L 6\WHP L \*HQHLDWRU L HQJLQ  
UHPHYG ♂ L UHSDLUHG ♂ L DQG L UHSODFH G L RQH L DW L D L WLFH ♂ L ZKLOH L XMLQJ L WKH L UHPDLQLQJ L VZR L JH  
RSHLDWH L WKH L 7UHDWPHQV L 6\WHP L DQG L WDI L L WDLCHU L L L

0V4 L -XOLH 6XOOLYDQ  
)HEUXDU\ L L → ☼ L L !! ¶ ← L  
3DUH L ↑ L RI L ← L L

\$6% L 7UHDWPHQV 6\WWP L ORGL LFDWLRQV L L L

5HFRWH L FRQLWRULQJ L ,PSURYHPHQW L ♂ )ORZ L OHWHU L DQG L S+ L FRQLWRU L L

'XULQJ L WKH L IDOO L RI L L !! ¶ → ☼ L HQJLQHULQJ L DGG L SODQQQJ L ZDV L FRPSCHWVG L WR L DGG L DGGWLRQD  
FRQLWRULQJ L DW L WKH L \$6% L 7UHDWPHQV 6\WWP L L L ,PSCHPHQWDLRQ L ZLOO L RFFXU L LQ L L !! ¶ ← L L L 7  
LPSURYHPHQW L LQFOXGH L WKH L IRORZLQJ L L

7KH L HWKDFO L DGG L VRGLXP L K\GUR[LGH L ♂ 1D2+ L GRMLQJ L UDWH L DUH L YHULILHG L FDQXDOO L EV L DFFH  
FDQRCH L DSSUR[LFDWDO L ZHN L GXULQJ L WKH L \$WDOQLF L 5LFKILHOG L :RUN L 6HDVQ L ♂ \$5:6 L DGG L PR  
GXULQJ L WKH L /LPLWHG L \$FFHW L 6HDVQ L ♂ /\$ L L L 7KH L +XPDQ L ODFKLGH L ,QWHUIDFH L ♂ +0, L UHJLV  
SXPS L VSHG L EXW L WKH L GRMLQJ L V\WWPV L DUH L GRW L FXUHQDO L HTXLSSHG L ZLWK L IORZ L FWHUJ L WR L D  
YHULI L GRMLQJ L UDWH L UFRWDO L L L ,QWDOOLQJ L IORZ L FWHUJ L RQ L WKH L HWKDFO L DGG L 1D2+ L OLGH  
UFRWH L FRQLWRULQJ L DGG L DGMXWPHQV L RI L WKH L FKPLFDO L GRMLQJ L UDWH L L L ,Q L DGGWLRQ L L WKH L IU  
FDQRCH L DFFHW L FRXG L EH L UHGXFH L L

7KH L S+ L DGG L R[LGDWLRQ L UHGFWLRQ L SRWHQVDO L ♂ 253 L FHDVXUHHQW L DUH L FXUHQDO L VHWVHG L FDQX  
0+ L RQH L SHU L ZHN L GXULQJ L WKH L \$5:6 L DGG L RQH L SHU L FROWK L GXULQJ L WKH L /\$ L WR L FRQILUP L V  
VRGLXP L K\GUR[LGH L LV L GRMLQJ L FRUHFWD L L L \$ L S+ L FHDVXUHHQW L VHQVU L ZLOO L EH L LQWDOOHG L LQ L  
WUDQPLWHU L DGG L 3/& L FRQHFWRQ L IRU L UDO L WLFH L FHDVXUHHQW L RI L WKH L V\WWP L S+ L L

7KH L LQIOXHQV L IORZ L IURP L WKH L \$6 L LV L FHDVXUHG L EV L D L CHMD L UHGGLQJ L RQ L D L Y L GRWFK L ZHLU L DQ  
GDV L UFRUGHU L L L 7KH L IORZ L GDV L LV L GRZORDG L SHULRGLFDOO L L L 7KH L \$6 L LQIOXHQV L :HLU L ZL  
WKH L +0, L EV L FRQHFWRQ L WKH L \$6% L +0, L WR L WKH L L L !! L P\$ L RXASXV L VLJDO L RQ L WKH L LQIOXHQV L  
DOORZLQJ L UDO L WLFH L IORZ L GDV L WR L EH L XHG L IRU L SURFH L DGMXWPHQV L L

3URMFW 6FKHGCH L

7KH L IRORZLQJ L L L !! ¶ ← L VFKHGCH L SURMFWLRQV L IRU L WUHDWPHQV UHODWVG L DFALYLVWHV L DUH L DSSUR  
VXEMFW L WR L FKQJH L LQ L WKH L HYHQV L RI L GHDO V L UHODWVG L WR L FRQWUXFWLRQ L DGPLQLWUDLYH L DSSUR  
FKQJHV L DFFHW L UHWULFWLRQV L ZHWKHU L UHODWVG L HTXLSPHQV SURECHV L RAKHU L FLUXPWDOFHV L  
WR L ZRUNLQJ L DW L D L KLJK L DQVWVGH L PLQH L VLVH L ZLWK L OLPLWHG L DFFHW L RU L RAKHU L IRUFH L FDMXUH  
VFKHGCH L VZRZLQJ L WKH L VHTXOH L DGG L DQWFLSDWVG L WLFH L IUDPHV L IRU L SODQGH L DFALYLVWHV L LV L SU  
\$WDFKHQV L \$ L L L 5HYLVHG L 5\$:3 L )LXUH L L L \*HQHDO L 6FKHGCH L IRU L 7UHDWPHQV \$FALYLVWHV L L

,PSCHPHQWDLRQ L RI L L !! ¶ ← L ZRUN L EHJDQ L LQ L -DQDU L ZLWK L RQJRLQJ L 2 0 L DFALYLVWHV L DW L WKH L \$  
6\WWP L L L 'X L WR L WKH L KLJK L VROGV L JHQHDLRQ L IURP L FROWLQHG L KLJK L IORZ L UDWH L DW L WKH L \$  
%LRUHDVU L VROGV L FDQJHPHQV DFALYLVWHV L DW L WKH L \$6% L 7UHDWPHQV 6\WWP L DUH L DQWFLSDWVG L W  
\$SULO L RU L OD L L L L





0V4 L -XOLH 6XOOLYDQ L  
)HEUXDU\ L L → ⚙ L L !! ¶ ← L  
3DUH L ← L RI L ← L L  
L  
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\$WDFKPHQW L

L \$WDFKPHQW \$ L ± L 5MYLVG L 5\$:3 L )LJXH L L ± L \*HQHDO L 6FKGXCH L IRU L 7UDPHQW \$FALY L  
L

FF L L L 6FRWW )HUJXMRQ L /DKRQNDQ L 5HJLRQD L :DWHU L 4XDOLM L &RQWRO L %RDUG L ± L YLD L  
'RXJ L &DUH\ ⚙ L /DKRQNDQ L 5HJLRQD L :DWHU L 4XDOLM L &RQWRO L %RDUG L ± L YLD L HCHFWURQLF L L  
1DWKQ L %CRAN ⚙ L %3 L \$PHULFD L ,QF L ± L YLD L HCHFWURQLF L  
5HJLRQDG L ,CDR ⚙ L \$WODQNLF L 5LFKILHOG L &RPSDQ\ L ± L YLD L HCHFWURQLF L  
%JLDQ L -RKQMRQ L \$WODQNLF L 5LFKILHOG L &RPSDQ\ L ± L YLD L HCHFWURQLF L  
\$GDP L &RKHQ ⚙ L (VT ⚙ L 'DYLVL \*UDKP L L 6WKEEV L //3 L ± L YLD L HCHFWURQLF L  
ODUF L 54 L /RPEDUGL ⚙ L \$0(& L ± L YLD L HCHFWURQLF L  
6DQG L 5LHM ⚙ L (Q6FL L ± L YLD L HCHFWURQLF L  
OLNH L -RKQMRQ L &RSSHU L (QYLRQPHQWDO L ± L YLD L HCHFWURQLF L  
%JLDQ L 9WLDQR ⚙ L %URDGEHQW L \$WRFLDWHV ⚙ L ,QF L ± L YLD L HCHFWURQLF L  
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